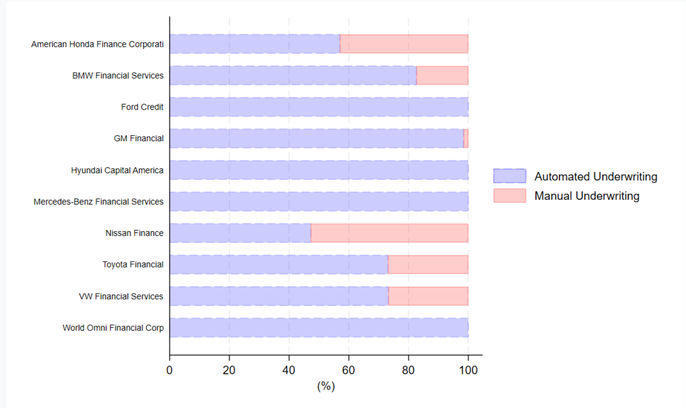
When Models Fail: Evidence from Automated Underwriting in Auto Loan Markets

Sarah Khoei — University of Kentucky | AFA 2026 Annual Meeting

1. Motivation

Automation is transforming consumer credit markets. It improves efficiency, expands access, reduces bias, and boosts profits *(Fuster et al., 2019; Howell et al., 2024; Gao et al., 2024; Jansen et al., 2024).*

Yet many lenders still rely on human underwriters, and time series do not explain this variation.



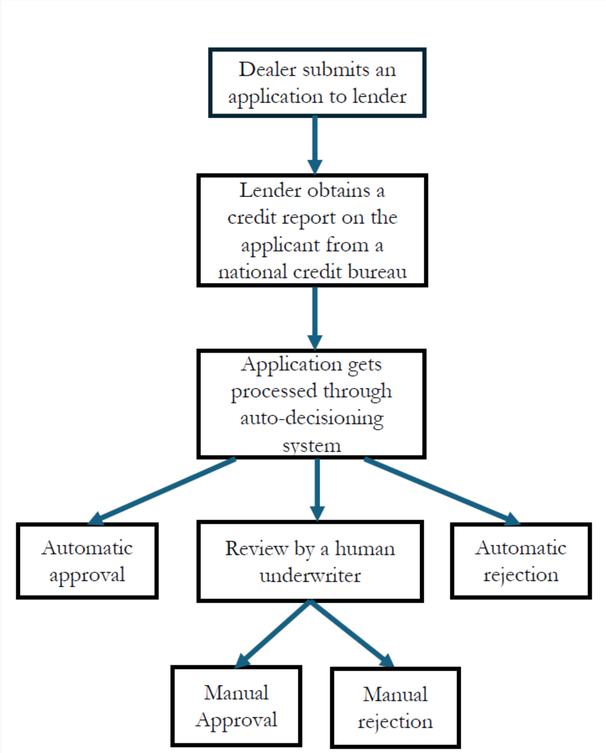
Puzzle: If automation works so well, why retain humans?

This paper: Model Risk
This risk arises when models rely on training data that does not include unexpected shocks, leading to errors when conditions change.

Hypothesis: Humans act as a **safeguard against model risk**—when algorithms fail under unexpected shocks.

Specific Research Setting: COVID-19 shock in the auto loan market as a natural test of automated vs. manual underwriting resilience.

2. Automated vs Manual Underwriting in Auto Lending Market



3. Data & Identification Strategy

Data: Granular loan-level data from Regulation AB II, covering millions of auto loans from top U.S. lenders

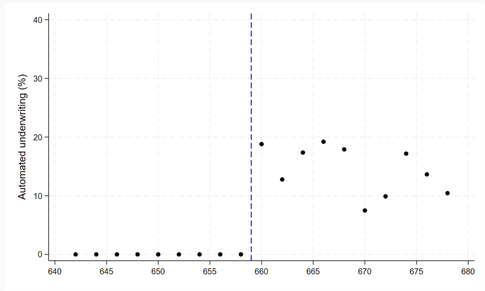
Data includes:
- 12 captive + 11 non-captive lenders
- Loan, vehicle, borrower characteristics
- Underwriting indicator
- Ex-post performance: delinquency, charge-off

Identification Strategy:

1- Within-lender variation: Difference-in-differences comparing loan performance for quasi-random assignments to human vs. automated underwriting before and after the pandemic.

Leverage **lender-specific underwriting discontinuities** that generate quasi-random assignment to human vs. automated review.

Volkswagen



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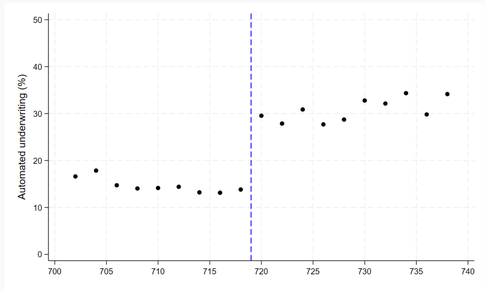


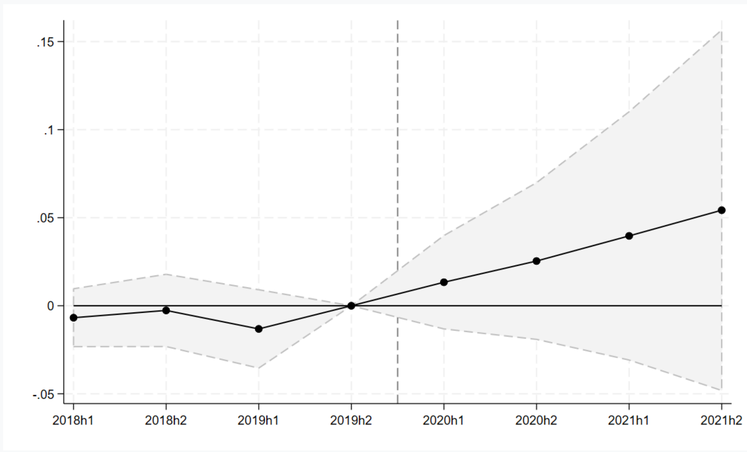
2- Across-lender variation: Difference-in-differences comparing the performance of loans originated by fully automated lenders to those originated by mixed-underwriting lenders before and after the pandemic.

4. Main Findings

- **At the loan-level:**

After COVID ⇒ Automated performance significantly deteriorates relative to humans.

Default rate went up for automated loans relative to manual loans after the pandemic.



- **At the lender-level:**

Lenders relying exclusively on automation faced systematically higher default risk when economic conditions shifted abruptly, whereas mixed lenders were better able to adapt through discretionary review.

Channel: Model Risk
- Models trained on pre-COVID data mispredict outcomes for borrowers more exposed to shocks and uncertainty.
- Concentrated impact: Performance drops most for high-risk borrowers.

Fully automated lenders pass on a portion of model risk to consumers by charging higher prices.

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